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GEOCHEMISTRY.—*Analysis of a brine from the Ligonier well in Pennsylvania.* C. H. KIDWELL, Water Laboratory, U. S. Geological Survey. (Communicated by C. E. Van Orstrand.)[1]

By the courtesy of Mr. J. B. Tonkin, Vice President of the Peoples Natural Gas Company, of Pittsburgh, Pennsylvania, a sample of a brine obtained at a depth of 6,184 feet in the Ligonier well was furnished to the U. S. Geological Survey for analysis. The Ligonier well, the Peoples Natural Gas Company's well No. 1588, is located less than one mile northwest of Longbridge, Pa., in Westmoreland County, between Loyalhanna Creek and the Lincoln Highway. It is the fifth deepest well in the world at this time and drilling is to be continued. With one exception, which will be considered later, no other analyses of ground water from this depth are available. Collection of the sample was made February 20, 1920. A half million cubic-foot flow of gas was encountered in the well at a depth of 6,822 feet. Results of an analysis of the water are given in table 1.

Reference to the table of reacting values (table 2), in which the values of the radicals are arranged in order of descending magnitude, shows that practically all the constituents of the brine are present in the form of chlorides, and although the fallacies of hypothetical combinations of the constituents of a water containing several different acidic radicles are too well established to warrant making hypothetical combinations as a general rule, in this case it happens that if the chloride were distributed among

[1] Published by permission of the Director, U. S. Geological Survey. Received May 8, 1920.

the basic radicles as they are arranged in the table of reacting values, the approximate percentages of the principal salts could be easily calculated because the chloride represents practically all the acidic radicles.

TABLE 1

CHEMICAL ANALYSIS OF WATER FROM LIGONIER WELL

		Grams per liter
Silica	(SiO_2)	0.008
Iron	(Fe)	0.084
Aluminum	(Al)	0.057
Titanium	(Ti)	None
Manganese	(Mn)	0.014
Calcium	(Ca)	8.68
Strontium	(Sr)	0.68
Barium	(Ba)	0.13
Magnesium	(Mg)	1.42
Lead	(Pb)	None
Bismuth	(Bi)	None
Sodium	(Na)	30.13
Potassium	(K)	0.63
Carbonate radicle	(CO_3)	None
Bicarbonate radicle	(HCO_3)	None
Phosphate radicle	(PO_4)	None
Chloride radicle	(Cl)	67.14
Sulphate radicle	(SO_4)	0.033
Nitrate radicle	(NO_3)	Trace
Bromide radicle	(Br)	None
Iodide radicle	(I)	0.022
Radium[a]	(Ra)	No appreciable quantity detected by gold-leaf electroscope
Sum		109.028

Total solids, converting Al to Al_2O_3 and Fe to Fe_2O_3.... 109.114
Specific gravity at 23.4° C..... 1.0777
Temperature of water at point of entrance into well, 67.3° C.[b]
The brine was slightly acid to methyl red and possessed a "stale" odor.

[a] Determined by Dr. L. I. SHAW, Bureau of Mines, Washington, D. C.

[b] Estimated for 6,184 feet from a series of temperature measurements made from depths of 100 to 6,000 feet by Mr. C. E. VAN ORSTRAND, U. S. Geological Survey.

A comparison of the analysis of the brine with that of an average analysis of sea water[2] shows that this brine is over three

[2] CLARKE, F. W. *The data of geochemistry*, U. S. Geol. Survey Bull. **695**: 123. 1920.

times as highly mineralized as ocean water. It is remarkable in its content of iodide in the absence of bromide, and to a lesser extent in its content of barium, manganese, and strontium.

According to Dr. Charles Butts,[3] Geologist, U. S. Geological Survey, the brine probably issued from shales representing the top or middle of the Hamilton formation of the Middle Devonian.

TABLE 2

REACTING VALUES IN MILLIGRAM EQUIVALENTS PER LITER[a]

Na	1307.64	Cl	1893.35
Ca	433.13	SO_4	0.6864
Mg	116.58	I	0.1733
K	16.109		
Sr	15.517		
Ba	1.898		
Mn	0.5096		
Total basic radicles[b]	1891.3836	Total acidic radicles	1894.2097

[a] The reacting value of an element or radicle is obtained by dividing its valence by its molecular weight and multiplying the resultant quotient by the number of milligrams of the element or radicle obtained analytically. It may be defined as its equivalence in capacity for chemical reaction to 1.008 milligrams of hydrogen or 8.000 milligrams of oxygen.

[b] Fe and Al are considered to be present as Fe_2O_3 and Al_2O_3 and therefore do not enter into the sum of reacting values.

Many hypotheses have been proposed to explain the origin of deep-seated brines. Several investigators have assumed that they represent entrapped ancient sea waters the composition of which has been altered by such agencies as precipitation, reactions from contact with basic magmas, evaporation, and leaching of sedimentary beds by percolating ground waters.

Such hypotheses are inadequate for the explanation of differences in the chemical character of deep-well brines and the ocean as it exists at the present time or as it existed in the past. The chemical composition of the Devonian sea is conjectural. It may have contained either more or less calcium and magnesium than the present ocean and the predominance of magnesium over calcium that now obtains in the ocean may have been reversed

[3] Personal communication.

in the ancient sea on account of a lesser number of calcium-secreting organisms, or the fact that they had not been active for a sufficient period of time to decrease the calcium content of the old ocean comparable to that of the modern sea. It is difficult to believe, moreover, that organisms could exist in a brine as concentrated as the one here described.

In order to explain satisfactorily the reversal of the calcium-magnesium ratio in brines of this nature as compared with sea water, the greater concentration of salts in the brines, the higher ratio of calcium to chloride in the brines, and the fact that mere concentration of water such as now constitutes the ocean will not form brines similar to those obtained from supposed fossilized oceans, it must be assumed that extensive alterations of the old ocean waters have occurred since the time of their inclusion. This has been discussed in a most excellent paper by R. Van A. Mills and Roger C. Wells[4] who advance the hypothesis that deep-seated brines are derived in part from waters of sedimentation, often described as "connate waters," and in part from meteoric waters the mixture of which in the lapse of geologic time has suffered vast changes through such geophysical and geochemical changes as concentration, evaporation, leaching of sediments, reduction of some constituents by organic matter, heat, pressure, incursion of petroleum, rock movements, and cementation. Concentration and evaporation have been materially assisted by the expansion or movement of gases through underground passages which have absorbed some of the water as moisture during their contact with it.

Several possible explanations are offered by Mills and Wells for the predominance of calcium over magnesium in deep-seated brines. At moderate temperatures hydrolysis may occur and the magnesium be precipitated as hydroxide, basic carbonat or carbonate. According to Hunt,[5] magnesium silicates and calcium chloride are formed when magnesium chloride reacts with calcium

[4] MILLS, R. VAN A., and WELLS, ROGER C. *The evaporation and concentration of waters associated with petroleum and natural gas.* U. S. Geol. Survey Bull. **693.** 1919.

[5] HUNT, T. S. *Chemical and geological essays,* p. 122. 1878.

silicates. Magnesium may have been separated from solution by this process.

Only one other analysis of a brine from a depth comparable to that from which this brine was obtained has been made, as far as is known. It was made by George Steiger[6] and represents a brine that is similar in chemical composition to the one reported here. The principal points of dissimilitude are that Steiger reported no silica, aluminum, or manganese, and only a trace of barium, all of which were obtained in small quantities in this analysis; he found bromide to be predominant over iodide, while in this brine iodide occurs to the exclusion of bromide; and he determined the total solids to be 263.64 grams in 1,000 grams.

ENTOMOLOGY.—*A new species of Phyllotreta.*[1] F. H. CHITTENDEN, Bureau of Entomology. (Communicated by L. O. Howard.)

In studying the injurious genus *Phyllotreta* accumulated in the U. S. National Museum and Bureau of Entomology, a species is found which is new to science. Like others of the genus, it attacks and undoubtedly breeds on cruciferous plants and is at least a potential pest. The description follows:

Phyllotreta utana Chittenden, sp. nov.

Elongate oval, moderately convex, shining black except last ventral segment which is opaque; thorax and elytra variably black or aeneous; elytral vittae very narrow, pale yellowish. Antennae less than half as long as body, joints 2 to 5 usually honey yellow, 1 and 6 either black or partly pale, remainder piceous. Each elytron with a very narrow vitta, moderately sinuate, curvature scarcely reaching beyond middle of elytron either at base or apex; each vitta with a short broad post-humeral branch. Tibiae piceous, tarsi fuscous.

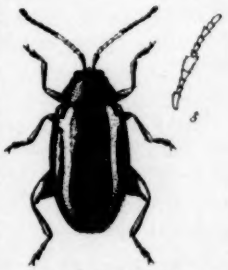

FIG. 1.—Phyllotreta utana

Male: Last ventral segment large, concave, nearly as long as segments 2–4 combined, moderately impressed at apex with a short median impressed line at base. Antennal joints 2–3–4

[6] CLARKE, F. W. *Water analyses from the laboratory of the United States Geological Survey.* U. S. Geol. Survey Water-Supply Paper **364**: 9. 1914.

[1] Received June 8, 1920.

subequal in length; 3 and 4 subtriangular; 3 distinctly wider; 4 much wider; 5 depressed, wider than 4, about one-half longer than wide, anterior ace shorter than posterior, nearly straight; 6 short, basal part generally pale and apical piceous.

Female: Last ventral segment simple and shorter. Antennae as in *zimmermanni* and *vittata*.

Length, 2.5–3.0 mm.; width, 1.4–1.5 mm.

Logan, Utah (type locality), July 9–12, 1906; June 20, 1904; Alta, Utah, June 29 (E. D. Ball and E. G. Titus); Park City, Utah, June 17, (Hubbard & Schwarz); Elko, Nev.; Corvallis, Ore. (C. F. Moznette.)

Type No. 23114, U. S. National Museum.

A good series of specimens shows considerable variation. One individual has all antennal joints piceous and another has bluish elytral humeri. The general appearance and punctation are similar to *zimmermanni*. In addition to the distinctive characters of the antennae (the fifth joint is flat, not bowed) and last ventral segment of the male, the elytral vittae are quite different from other species, approaching *zimmermanni*, but pale, not distinctly yellow as in that species. It is also larger than the latter, which measures only 2–2.5 mm.

This species was observed by Prof. E. G. Titus and Dr. E. D. Ball at Logan, Utah, in June, 1904, attacking sugar beet. It was abundant in a beet field overgrown with hedge mustard, on which it was also taken.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

BOTANY.—*Germination of barley pollen.* STEPHEN ANTHONY and HARRY V. HARLAN. Journ. Agric. Res. **18:** 525–536. 1920.

The paper reports the first artificial germination of barley pollen and gives in detail the methods by which this was accomplished. It was found that barley pollen was extremely sensitive to moisture, so sensitive that it could be killed by blowing one's breath upon it. It was equally sensitive to dryness, shrinking perceptibly in two minutes when exposed to free air. A few minutes of such exposure resulted in death. All attempts to germinate the pollen in solutions or upon media or membranes, resulted in failure. Germination was finally accomplished by exposing the pollen to an atmosphere in which the humidity gradually increased. Growth of lengthy tubes occurred in five minutes. H. V. H.

BOTANY.—*The genera of grasses in the United States with special reference to the economic species.* A. S. HITCHCOCK. U. S. Dept. Agric. Bull. **772.** Pp. 307, pls. 20, figs. 174. 1920.

This paper contains an introduction on the scope and plan of the work, including an economic classification of grasses based on uses; a description of the grass family; descriptions of the subfamilies with keys to the tribes, and under each tribe, keys to the genera and descriptions of the genera. The arrangement of the tribes differs from the usual presentation in that the more primitive are placed first, thus: Bamboseae, Festuceae, Hordeae, Aveneae, Agrostideae, Nazieae, Chlorideae, Phalarideae, Oryzeae, Zizanieae, Melinideae, Paniceae, Andropogoneae, Tripsaceae. Under each genus is given a technical description, with synonymy. The type of each genus is selected whether the names are valid or cited in synonymy, and the reasons for the selection are given in all cases. Following this under each genus is given information on all species that are likely to have attracted the attention of agriculturists. Each genus is illustrated by one figure and the larger genera by more than one. There are 144 genera described.

A. S. H.

BOTANY.—*Effect of the relative length of day and night and other factors of the environment on growth and reproduction in plants.* W. W. GARNER and H. A. ALLARD. Journ. Agric. Res. **18:** 553–606. 1920.

It is found that the relative length of the day to which the plant is exposed is in many species a factor of great importance in growth and development, especially as regards sexual reproduction. While early, medium, late and very late maturing varieties of soybeans required at Washington about 26, 62, 73 and 110 days, respectively, to attain the flowering stage when exposed to the full seasonal length of day of the summer, all of these varieties flowered within 28 days when the daily light exposure was reduced to 12 hours or less. Certain varieties of tobacco, aster, ragweed, etc., behaved similarly. On the other hand, certain plants, as Raphanus, Hibiscus, and Mikania, flowered only under a relatively long daily light exposure. By suitable control of the daily light exposure certain annuals were forced to complete two cycles of alternate vegetative and reproductive activity in a single season. It was found, also, that flowering may be delayed more or less indefinitely when the length of the exposure is unfavorable, and this may result in a corresponding prolongation in the period of growth. By use of tungsten filament electric lamps to increase the illumination period of the short winter days the results obtained with several species were similar to those obtained during the natural long days of summer, *i. e.*, the vegetative or the reproductive phases of development were initiated or inhibited, depending on the specific requirements of the plants used. With an illumination period favorable both to vegetative and reproductive activity there was a marked tendency in several species toward the "ever-blooming" or "ever-bearing" habit. In all species studied the rate of growth (increase in height) was proportional to the length of the daily period of illumination. Although the length of the daily illumination period may exercise a controlling influence on the attainment of the reproductive stage, it appears from experiments detailed in this paper that differences in light intensity ranging from full normal sunlight to less than a fourth of the normal do not greatly affect this phase of plant development. Hence it is concluded that, within the range indicated, the total quantity of solar radiation received by the plant daily during the summer season is of little importance directly as regards attainment of the flowering stage. The term *photoperiodism* is suggested to indicate the response of the organism to the relative length of day and night. W. W. G.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

WASHINGTON ACADEMY OF SCIENCES

141ST MEETING

The 141st meeting of the ACADEMY was held jointly with the Biological Society of Washington at the Cosmos Club, at 8.15 p.m. on Saturday, February 21, 1920. ALFRED G MAYOR, Director of the Department of Marine Biology of the Carnegie Institution of Washington, delivered an address, illustrated with lantern slides, on *The coral reefs of American Samoa*. A brief abstract of the address has been published in the proceedings of the Biological Society (see this JOURNAL, **10:** 309. May 19, 1920).

142D MEETING

The 142d meeting was held jointly with the Anthropological Society of Washington in the auditorium of the National Museum, at 8.15 p.m. on Saturday, March 6, 1920. President G. M. KOBER of the Anthropological Society presided. W. H. R. RIVERS, of St. John's College, Cambridge, England, delivered an address on *Ethnology: its aims and needs*.

143D MEETING

The 143d meeting was held at the Cosmos Club at 8.15 p.m. on Thursday, March 18, 1920. President C. L. ALSBERG presided. J. WALTER FEWKES, Chief of the Bureau of American Ethnology, Smithsonian Institution, delivered an address, illustrated with lantern slides, on *American archaeology: its history and technique*.

144TH MEETING

The 144th meeting was held jointly with the Chemical Society of Washington (the local section of the American Chemical Society) at the Cosmos Club, at 8.15 p.m. on Thursday, March 25, 1920. President C. O. JOHNS of the Chemical Society presided. E. T. WHERRY, of the Bureau of Chemistry, U. S. Department of Agriculture, delivered an address, illustrated with lantern slides and experiments, on *Soil reaction and plant distribution*.

The methods used in testing soils, and a proposed method of statement of acidity and alkalinity, have already been published in the JOURNAL,[1] and a paper on the subject for one of the botanical journals is in preparation.

[1] This JOURNAL, **9:** 305–309. 1919. **10:** 217–223. April 19, 1920.

145TH MEETING

The 145th meeting of the ACADEMY was held jointly with the Medical Society of the District of Columbia and the Anthropological Society of Washington on Wednesday, March 31, 1920. The meeting was called to order at 8.20 p.m. in the assembly hall of the Carnegie Institution of Washington by President F. R. HAGNER of the Medical Society. Sir ARTHUR NEWSHOLME K.C.B., formerly Chief Medical Officer of Health of the Local Government Board of England, and during the past season Professor of Hygiene in the School of Public Health of Johns Hopkins University, Baltimore, Maryland, delivered an address on *The national importance of child welfare work*. The address was illustrated with lantern slides.

The lecturer sketched briefly the history of the development of child welfare work in England. It arose out of the gradual awakening of the people to the risks of unhygienic environment, emphasized by the ravages of the great plagues such as cholera and typhus fever. The growth of industrialism and the increasing population of the cities are really at the bottom of this awakening. The health reforms of the past seventy years are a part of the attack made on the problems raised by these two conditions.

The study of these problems and their remedies has increasingly emphasized the fact that the death rate in childhood is unnecessarily high. The study of the death rate of children carries us still farther back and shows that the care of the mother immediately before and after the birth of the child is as necessary as the care of the children themselves.

To reduce this needless loss of mothers and children, which is comparable in magnitude with the loss of life in the Great War, the following conditions must be ameliorated: (1) Careless, shiftless, or immoral motherhood or fatherhood. (2) Ignorance, especially of civic duties, of the most desirable ideals of family life, and of the elementary methods of proper housekeeping and cooking. The ignorance of the poor is more serious than the ignorance of the rich, since the ignorance of the rich can be made up for from without. (3) The lack of the essentials of life and health, such as proper food and clothing and expert assistance at critical periods. (4) Ignorance of the public and its leaders as to the actual conditions in the community, which can be remedied either by surveys in specialized fields, or, better, by competent statistics which are in reality a continuous survey. It is in this feature particularly that the public health movement in the United States is hitherto lacking. The statistics of birth and puerperal diseases are most strikingly inadequate in the United States, and no solid progress can be made until the data by which such progress can be measured are made more complete and dependable.

Nutrition is the be-all and end-all of a child's life up to the age of seven, and all other things must be subsidiary. The agencies to be considered and improved are play, sleep, cleanliness, exercise, food, and

shelter. The lecturer exhibited a series of tables, curves, and columnar diagrams illustrating the statistics that have been obtained on these subjects in England, and the decrease in infant and child mortality that has followed improvements in the conditions. An item of particular interest in this series of data dealt with the effect of diminished infant mortality on the death rate of the community as a whole. It has been urged by many that the saving of infant lives works directly against that process of natural selection which is assumed under the conditions of civilized life to continue to weed out unfit individuals early in life. If this were the case it is to be expected that communities having a high infant mortality should show a decreased mortality in part or all of the subsequent age periods. The statistics show that exactly the contrary is the case. Individuals in a community with high infant mortality have a smaller expectation of life throughout their entire period of life than do individuals in a community with low infant mortality. In other words, any action of natural selection that continues is so small a factor under present conditions that it does not appear on the curves. The same preponderant effect of evil environmental circumstances persists in the successive years of life as was evidenced in infancy.

The lecturer then showed a series of diagrams illustrating the various agencies that have been developed in England to remedy the conditions described.

The discussion was participated in by Drs. WALL, J. A. FOOTE, G. M. KOBER, LIVINGSTON FARRAND, and T. A. WILLIAMS.

ROBERT B. SOSMAN, *Corresponding Secretary.*

PHILOSOPHICAL SOCIETY OF WASHINGTON

The 826th meeting was held at the Cosmos Club, Dec. 20, 1919, with President SOSMAN presiding and 34 persons present. The minutes of of the 823rd and 824th meetings were read in abstract and approved.

The first paper was by Mr. J. WARREN SMITH on *Predicting minimum temperatures,*[1] and was illustrated by lantern slides.

This paper was a mathematical discussion of the relation between the relative humidity in the late afternoon and the variation of the minimum temperature during the coming night from the afternoon dewpoint temperature, when radiation conditions prevail. The study shows that there is a well defined relation which can be expressed by the curve for a parabola. This curve can be constructed by the "star point" method of curve fitting instead of by the more tedious well known least square method.

The equation used is written $v = x + by + cz$ in which v is the variation of the minimum temperature from the evening dewpoint; b is the evening relative humidity, and c is the square of the relative humidity. x, y, and z are the three unknowns, which are evaluated

[1] Full publication in Monthly Weather Review Supplement, No. 16, pp. 6–19. 1920.

from three normal equations which are readily written by the star point method after the data have been properly charted. The results are remarkably accurate. The studies show that the minimum temperature can be closely predicted n the orchard at a considerable distance from the observing station; that the hygrometric observations made at noon may be used quite as well in some instances as those made in the evening, and that the equation will sometimes apply as well to cloudy as to clear nights.

By using the depression of the dewpoint instead of the relative humidity in correlating with the variation of the minimum temperature from the dewpoint there is, in some instances, an even closer relation shown. In this case a straight line from the equation $v = x + yd$ fits the data fully 83 per cent of the time. In this equation d is the depression of the dewpoint, v is the variation of the minimum from the dewpoint, and x and y the two unknowns.

Discussion: Mr. ABBOT exhibited a slide indicating a relation between solar-constant variations and minimum temperatures.

Mr. BROOKS spoke of the effect of snow cover in lowering the minimum temperatures.

Replying to question by Mr. SOSMAN, Mr. SMITH stated that the protection afforded to orchards by the use of heating pots was not due to the smudge produced but to an actual increase of from 4 to 8 degrees in the temperature of the air.

Mr. HUMPHREYS showed that the artificially heated air in an orchard does not rise far on account of a marked temperature inversion.

The second paper was by Mr. CHARLES F. BROOKS on *Clouds and their significance*,[2] and was also illustrated by lantern slides.

When closely observed, clouds are remarkable indices of atmospheric processes and movements. Their forms and motions may be used not only directly in determining what general winds and turbulence exist at different levels, but also in surmising the vertical distribution of temperature and humidity. Here without the expense of apparatus are the means for discerning what is happening in he atmosphere up to great heights, and, therefore, the means for determining the causes of certain features of our weather, and for forecasting local changes. Also, the effect of cloudiness on the temperature and humidity of the lower air is not to be overlooked.

The cloud transformations and movements during the passage of a strong low-pressure area in winter give a fairly clear picture of the internal dynamics of such a storm. As the low approaches, a relatively warm southerly wind enters like a sideways-moving wedge over the cold surface air, and under the westerly upper wind. The lower surface of contact is frequently marked by stratus clouds formed by mixture, and the upper by alto-cumulus clouds formed by thermal convection due to the warmth of the southerly wind relative to that above. Later, the warm wind reaches the earth's surface. The lines of appreciable

[2] This paper was published in the Monthly Weather Review, **48**: 26–28, Jan., 1920.

wind convergence are marked by nimbus and more or less continuous rainfall. Where such nimbus is formed the forced ascent of the air may go to great heights and thus supply the fast upper winds with the material for the drawn-out cirrus and cirro-stratus clouds that go far in advance of the storm and later for the heavy alto-stratus. As the center of lowest pressure goes by, perhaps not far to the north, an underrunning wedge of cold air may, by raising the warm moist southwesterly current above, bring on a few more hours of rainfall. This cold wind carries strato-cumulus clouds, formed by the turbulence and thermal convection, for perhaps a day, while the last of the long SW.-NE. lines of alto-stratus and cirro-stratus clouds, forming by the underthrust of the lower wind which lifts the higher moist layers, gradually pass over the eastern horizon.

It is evident from studies of the appearance and transformations of cloud forms that the different types of clouds are very closely interrelated and pass from one form to another without any recognizable dividing line.

Since our weather is largely the result of the interaction of over- and underrunning winds, clouds as indices of such are valuable in showing what is going on and what is to be expected. Cloud observations are finely complementary to pilot-balloon observations, for which there must be clear air and a lack of even intermittently intervening clouds. The whole domain of meteorology has no easier, more interesting, or more promising aspect for observations and study than clouds.

Discussion: In response to a question by Mr. FENNER, Mr. BROOKS stated that the cloud sequence during the progress of a cyclone was different for different parts of the country. Mr. HUMPHREYS called attention to the unsatisfactory nature, from the scientific point of view, of cloud nomenclature.

The meeting adjourned at 10.03 p.m.

S. J. MAUCHLY, *Recording Secretary.*

SCIENTIFIC NOTES AND NEWS

MATTERS OF SCIENTIFIC INTEREST IN CONGRESS[1]

The bill for a tariff on scientific instruments, etc. (H. R. 7785)[2] was brought up on the Senate calendar on April 5, but was passed over. On April 28, Mr. KNOX offered an amendment providing for the exemption from import duty of "guaranteed disks, ten inches or more in diameter, for astronomical telescopes."

The Second Deficiency bill for 1920 (H. R. 12046) passed the House on February 5, and the Senate on February 20. After two conferences the House and Senate agreed to final passage on March 2 and 3, and the bill became Public Law 155 on March 8. A proposed appropriation of $100,000 to enable the Bureau of Mines to investigate gases in vehicular tunnels,[3] in anticipation of the construction of such a tunnel under the Hudson River, was thrown out by the Senate on a point of order.

The widely differing viewpoints of members of Congress regarding research were brought out in discussions of certain paragraphs of this bill and other appropriation bills. Three principles that are more or less obvious to workers in scientific subjects are far from being universally accepted in Congress, namely: (1) that a successful research institution is a result of years of growth, and continuity is essential to its success; (2) that any nation which expects to keep to the front in world competition must encourage research; and (3) that, when accounting is made in terms of decades rather than years, research is the best paying business in the world. Mr. MANN, for example, in objecting to certain appropriations, says on February 2: "The Coast and Geodetic Survey is a good service. It is mainly scientific. They do good work, but a good deal of it is useless. Very little of it is absolutely necessary to-morrow. . . . . If we are ever to have economy we have got to commence on these things which are not essential." Mr. MCLAUGHLIN of Michigan, on the other hand, discussing an item for chemical research, says on February 11: "In regard to this, as in regard to other highly scientific and investigational matters, it is difficult for the Committee to determine whether or not the money is needed or whether or not the work done by the expenditure of the money is satisfactory. We all know that wonderful results have followed experiments and scientific investigations. . . . . Splendid results have been found in the most unpromising field, and when scientific gentlemen in whom we have confidence come before us and ask for appropriations to enable them to carry on work, we are loath to refuse them as we hesitate to criticize the work they are doing."

[1] Preceding report: this JOURNAL, **10**: 243. 1920.

[2] This JOURNAL, **9**: 454. 1919.

[3] See this JOURNAL, **10**: 54. 1920.

The appropriations in the Second Deficiency Act include: $75,000 for continuation of the investigation of the mineral resources of Alaska, to be available also during 1921; and $47,100 for the continuation of magnetic and geodetic work by the Coast and Geodetic Survey.

The legislative, executive, and judicial appropriation bill (H. R. 12610), carrying appropriations for the Bureau of Standards, passed the House on March 4, and the Senate on April 1. After agreement to the conference reports the bill was sent to the President, carrying an amendment introduced by Mr. SMOOT on April 1 to the effect that no government journal, magazine, or periodical should be printed, issued, or discontinued without the approval of the Joint Committee on Printing. On account of the inclusion of this amendment the President vetoed the bill on May 13. The objectionable paragraph was eliminated and the bill repassed and signed as Public Law No. 231.

The act includes $432,360 for salaries at the Bureau of Standards, together with many special research items of which the following are examples: fire-resisting properties of building materials, $25,000; development of color standards, $10,000; optical glass, $25,000; metallurgical research, $25,000; sugars and sugar-testing apparatus, $30,000; high temperature measurement and control, $10,000. Total for the Bureau, $1,217,360.

Hearings on the Jones-Reavis bill (S. 2232)[4] for a Federal Department of Public Works were held before the Senate Committee on Public Lands on February 11. The bill was supported by M. O. LEIGHTON, Chairman, and C. T. CHENERY, Secretary, of the National Public Works Department Association; J. PARKE CHANNING, Chairman of Engineering Council; G. F. SWAIN, of Harvard University; F. L. CRANFORD, President of the General Contractors' Association; Colonel F. M. GUNBY; C. W. BAKER, Consulting Editor, *Engineering News-Record;* FRANCIS BLOSSOM, of the War Department; C. W. WHITAKER, Editor, *Journal American Institute of Architects;* W. F. WILLOUGHBY, Director, Institute for Government Research; and P. N. MOORE, mining engineer.

A joint resolution looking toward an even more comprehensive reorganization of the executive departments than that contained in the Jones-Reavis bill was introduced as H. J. Res. 353 on May 7 by Mr. MADDEN. The resolution provides for a Joint Committee on Reorganization consisting of three members each from House and Senate. Referred to the Committee on Rules.

Another reorganization and consolidation measure is S. 4369, introduced by Mr. HENDERSON on May 12: "To create a Division of Mines and Geology in the Department of the Interior." The proposed Division would be under the direction of an Assistant Secretary of the Interior, "technically qualified by experience and education," at a salary of $10,000. The powers and duties of the present Geological Survey and Bureau of Mines, and any powers and duties of other

[4] This JOURNAL, 9: 422. 1919.

federal agencies relating to mining, metallurgy, mineral technology, geological surveying, land classification, or mineral resources, would be transferred to the new Division. The bill was referred to the Committee on Mines and Mining.

The recommendations of the Reclassification Commission were embodied in a bill (S. 4106) introduced in the Senate by Mr. JONES of New Mexico on March 22. A very thorough review of this legislation was given in the Senate by Mr. HENDERSON on April 29.

More liberal provisions regarding inventions by members of the Government bureaus than are provided by existing law are contained in H. R. 9932 and S. 3223: "Authorizing the Federal Trade Commission to accept and administer for the benefit of the public and the encouragement of industry, inventions, patents, and patent rights, and for other purposes."[5] The Senate bill, after reference from the Committee on Patents, was debated on March 22, and was amended by the insertion of a provision that the Commissioner of Patents should grant patents of the type described in the bill without the payment of any fee. The bill passed the Senate on March 22 and was referred to the House Committee on Patents, from which it was favorably reported on May 12.

One of the periodical attempts to reform the calendar is contained in H. R. 13574, introduced by Mr. SCHALL on April 12: "To provide for a modification of the time calendar now in general use in the United States, the modified form to be known as the Liberty Calendar." The modified calendar divides the year into 13 months of 28 days each, with a New Year Day which is not included within any month, and likewise a Leap Year Day in every fourth year, both of which are legal holidays. The bill was referred to the Committee on the Judiciary.

A special research of a geological character is planned for in S. 3829 (Mr. PHIPPS, February 2): "Making an appropriation for the investigation of underground currents, particularly shallow underground waters, and artesian wells in eastern Colorado." Referred to the Committee on Public Lands.

NOTES

A joint conference of national, state and regional engineering societies met at the Cosmos Club June 3–4, for the purpose of organizing to carry into effect the plans of development committees of the national societies. About 140 delegates, representing about 70 engineering organizations throughout the country, were present. The conference resulted in the formation of the "Federated American Engineering Societies," under the management of a representative body to be known as the "American Engineering Council." The principal discussion was on the resolution: "That it is the sense of the Conference that the

[5] For an analysis of the bill see Science, **51**: 421–427. 1920.

proper organization should be an organization of societies and affiliations and not of individuals." This was opposed principally by representatives of the American Association of Engineers, but was finally unanimously adopted.

The fifteenth annual meeting of the American Association of Museums was held at the Natural History Building of the National Museum on May 17–19. Announcement was made of the incorporation of the Association.

A scientific congress has been organized to meet at Honolulu August 2–20. Its object is to outline scientific problems of the Pacific Ocean region, suggest methods for their solution, make an inventory of existing knowledge, and devise plans for future work. The program is in charge of the Committee on Pacific Exploration of the National Research Council. Among those in attendance from Washington will be: PAUL BARTSCH, of the National Museum; WILLIAM BOWIE, of the Coast and Geodetic Survey; T. WAYLAND VAUGHAN, of the U. S. Geological Survey; H. S. WASHINGTON, of the Geophysical Laboratory, Carnegie Institution of Washington; and H. O. WOOD, of the Research Council.

A laboratory for research on dyestuffs and explosives has been established at George Washington University. The laboratory, which is under the general supervision of Professor H. C. MCNEIL, will be in charge of Mr. G. W. PHILLIPS, formerly of the Chemical Warfare Service. Dr. C. E. MUNROE, of the National Research Council, will be consulting chemist of the laboratory.

The Bureau of Mines has completed arrangements for a cooperative research on the carbonization of lignite. $200,000 is to be supplied by private parties for the erection of a plant at New Salem, North Dakota. The Bureau will be in charge of the technical and experimental side of the investigation.

A new solar constant observing station is being established on the Haqua Hala Mountains near Wenden, Arizona, which will be equipped with apparatus now in use at Mt. Wilson, California. At the same time the Calama, Chile, station is being removed to the summit of a mountain about ten miles south of Calama, where it will be about 10,000 feet above sea level and free from interference due to the dust and smoke from the town and mine.

Messrs. CARLETON R. BALL, A. S. HITCHCOCK, and R. A. OAKLEY, of the Bureau of Plant Industry, received the honorary degree of Doctor of Science from Iowa State College in June.

Dr. HARVEY BASSLER, formerly paleontologist with the U. S. Geological Survey, is now engaged in exploratory work for the Standard Oil Company in South America.

Prof. MARSTON TAYLOR BOGERT, of Columbia University, has been given a recess appointment by the President as a member of the U. S. Tariff Commission. Doubt has been raised as to the legality of the appointment, based on the fact that this and other appointments had been submitted to the Senate but no action was taken before adjournment.

Mr. EUGENE SEWELL BRUCE, special inspector for the U. S. Forest Service, died on June 8, 1920, in his sixty-first year. He had been with the Service since 1900, having previously been connected with several large lumber companies. He was a member of the Society of American Foresters.

Prof. H. A. BUMSTEAD, professor of physics and director of the Sloane Physical Laboratory, Yale University, has been elected Chairman of the National Research Council for the year ending July 1, 1921.

Dr. H. D. CURTIS, of the Lick Observatory, has been appointed director of the Allegheny Observatory at Pittsburgh, Pennsylvania. Dr. KEIVIN BURNS, recently of the Bureau of Standards, will be associated with Dr. Curtis in the work of the Observatory.

Mr. B. S. BUTLER has resigned his position as geologist on the U. S. Geological Survey to take up private work, and has been associated since July 1 with L. C. GRATON in making surveys of copper properties in Michigan.

Mr. S. H. CATHCART is resuming his work in Alaska for the U. S. Geological Survey.

Mr. C. F. CHOATE, JR., has been made a regent of the Smithsonian Institution by Public Resolution No. 37, passed by the Senate on March 3 and the House on April 5.

Mr. WILLIAM CHURCHILL, Associate in Primitive Philology, Carnegie Institution of Washington, died on June 9, 1920, in his sixty-first year. Mr. Churchill was born at Brooklyn, New York, October 5, 1859. He had been consul-general in Samoa and Tonga, and had been a member of the editorial staff of the *New York Sun* for 13 years, before joining the Carnegie Institution in 1915. During the war he was in charge of the division of foreign language publications of the Committee on Public Information.

The Willard Gibbs medal of the Chicago Section of the American Chemical Society "in recognition and encouragement of eminent research in theoretical and applied chemistry" was presented to Dr. F. G. COTTRELL, of the Bureau of Mines, on May 21.

Dr. J. WALTER FEWKES, chief of the Division of American Ethnology, left Washington in June to continue his archeological work on the ruins in Mesa Verde National Park. Unusual storms in the Rockies rendered roads in the Park inaccessible during the spring.

Dr. GORDON S. FULCHER, of the Research Information Service, National Research Council, resigned on June 1 to join the research staff of the Corning Glass Works at Corning, New York.

Mr. J. M. HILL, geologist of the U. S. Geological Survey, was transferred on July 1 to the Survey's office in San Francisco, in order to be more directly in touch with western metalliferous mines.

Mr. E. A. HOLBROOK, formerly superintendent of the Pittsburgh branch of the Bureau of Mines, has been transferred to Washington as assistant to the Director, Dr. F. G. COTTRELL, whose nomination has been confirmed by the Senate.

Mr. CHARLES M. HOY, who is collecting for the Smithsonian Institution in Australia, reports that within the past few years many of the characteristic mammals of Australia have been rendered extinct or nearly so as a result of the introduction and rapid multiplication of foxes and cats.

The University of Arizona has conferred the honorary degree of Doctor of Laws on Dr. T. H. KEARNEY, of the Bureau of Plant Industry, in recognition of his work on the breeding of Egyptian long-staple cotton in Arizona.

Prof. VERNON KELLOGG, professor of entomology at Leland Stanford, Jr., University, has been elected secretary of the National Research Council for the year ending July 1, 1921.

Mr. W. S. W. KEW, of the U. S. Geological Survey, is studying the oil conditions of northwestern Mexico for private parties while on furlough from the Government service.

Dr. F. LAMSON-SCRIBNER, of the Department of Agriculture, has received the degree of Doctor of Philosophy from the University of Maine.

Prof. JOHN CAMPBELL MERRIAM, professor of vertebrate paleontology at the University of California, and recently acting chairman of the National Research Council, was elected president of the Carnegie Institution of Washington on May 25, to succeed Dr. R. S. WOODWARD, who retires at his own request after sixteen years of service in the presidency. Dr. Merriam will assume office January 1, 1921.

Dr. JOHN R. MOHLER, chief of the Bureau of Animal Industry, U. S. Department of Agriculture, received the degree of Doctor of Science from Iowa State College on June 9.

Mr. R. M. OVERBECK has returned from Bolivia and will resume his work in Alaska for the U. S. Geological Survey.

Dr. C. L. PARSONS was appointed as delegate from the National Research Council to the meeting of the International Chemical Union, held in Rome during the last week of June. Dr. Parsons went to Europe in April on private business, expecting to remain until after the meeting in Rome.

Prof. H. POSTMA, of Feist, Holland, visited Washington in May and examined materials in the Division of Physical Anthropology of the National Museum.

Mr. M. J. PROFFITT, formerly of the Great Western Sugar Company, Denver, Colorado, has been put in charge of sugar technology at the Bureau of Standards.

Dr. BRAYTON H. RANSOM, of the Bureau of Animal Industry, has been elected a corresponding member of the Société de Pathologie Exotique of Paris.

Mr. EDWARD SAMPSON, of Princeton University, has been appointed assistant geologist in the metalliferous section of the U. S. Geological Survey.

Mr. EUGENE STEBINGER, geologist in charge of the Foreign Section of the Mineral Resources Branch, U. S. Geological Survey, has been granted furlough from June 1, in order to go to South America for an American oil company. He is accompanied by HARVEY BASSLER and J. B. MERTIE of the Survey.

Mr. HENRY EARL SURFACE, formerly chemist in the U. S. Forest Service, and recently transferred to the Treasury Department, was killed in a railway accident near Schenectady, New York, on June 9, 1920. Mr. Surface joined the Forest Service in 1907, after graduation from Ohio State University. He went to Madison, Wisconsin, in June, 1910, when the Forest Products Laboratory was transferred to that place. In 1919 he was transferred to the Bureau of Internal Revenue in connection with the valuation of forest lands. He was a member of the Chemical Society.

Dr. W. VAN BEMMELEN, director of the magnetic and meteorological observatory at Batavia, Java, spent several weeks in Washington in June, visiting the laboratories of the city.

Secretary CHARLES D. WALCOTT, of the Smithsonian Institution, left Washington on June 19 to spend the summer in geological field work in the Canadian Rockies.